

Claims

1. A complex oxide having a composition represented by the formula $\text{Ln}_{1-x}\text{M}_x\text{NiO}_y$; wherein Ln is a lanthanide, M is at least one element selected from the group consisting of Na, K, Li, Zn, Pb, Ba, Ca, Al, Bi, and rare earth elements being not the same as Ln; and $0 \leq x \leq 0.8$; and $2.7 \leq y \leq 3.3$, the complex oxide having a negative Seebeck coefficient at 100°C or higher.
2. A complex oxide having a composition represented by the formula $\text{Ln}_{1-x}\text{M}_x\text{NiO}_y$; wherein Ln is a lanthanide, M is at least one element selected from the group consisting of Na, K, Li, Zn, Pb, Ba, Ca, Al, Bi, and rare earth elements being not the same as Ln; $0 \leq x \leq 0.8$; and $2.7 \leq y \leq 3.3$, the complex oxide having an electrical resistivity of 1 Ωcm or less at 100°C or higher.
3. A complex oxide having a composition represented by the formula $(\text{Ln}_{1-x}\text{M}_x)_2\text{NiO}_y$; wherein Ln is a lanthanide, M is at least one element selected from the group consisting of Na, K, Li, Zn, Pb, Ba, Ca, Al, Bi, and rare earth elements being not the same as Ln; $0 \leq x \leq 0.8$; and $3.6 \leq y \leq 4.4$, the complex oxide having a negative Seebeck coefficient at 100°C or higher.
4. A complex oxide having a composition represented by the formula $(\text{Ln}_{1-x}\text{M}_x)_2\text{NiO}_y$; wherein Ln is a lanthanide, M is at least one element selected from the group consisting of Na, K, Li, Zn, Pb, Ba, Ca, Al, Bi, and rare earth elements being not the same as Ln; $0 \leq x \leq 0.8$, and $3.6 \leq y \leq 4.4$, the complex oxide having an electrical resistivity of 1 Ωcm or less at 100°C or higher.
5. An n-type thermoelectric material comprising the complex oxide of any one of Claims 1 to 4.
6. A thermoelectric module comprising the n-type thermoelectric material of Claim 5.